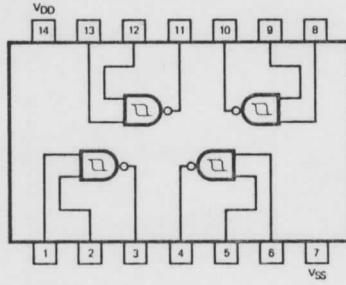


# 4093B

## QUAD 2-INPUT NAND SCHMITT TRIGGER

**GENERAL DESCRIPTION** — The 4093B is a Quad 2-Input NAND Schmitt Trigger offering positive and negative threshold voltages,  $V_{T+}$  and  $V_{T-}$  which show very low variation with temperature (typically 0.0005 V/ $^{\circ}$ C at  $V_{DD} = 10$  V) and typical hysteresis,  $V_{T+}$  to  $V_{T-} \geq 0.33$  V $_{DD}$ . Outputs are fully buffered for highest noise immunity.

LOGIC AND CONNECTION  
DIAGRAM DIP (TOP VIEW)



**NOTE:**  
The Flatpak version has the same pinouts (Connection Diagram) as the Dual In-line Package.

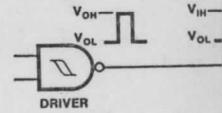
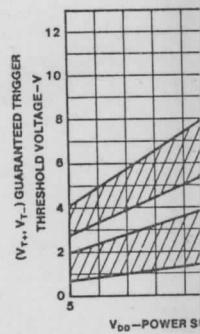
**DC CHARACTERISTICS:**  $V_{DD}$  as shown,  $V_{SS} = 0$  V (Note 1)

SYMBOL	PARAMETER	LIMITS									UNITS	TEMP	TEST CONDITIONS				
		$V_{DD} = 5$ V			$V_{DD} = 10$ V			$V_{DD} = 15$ V									
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX							
$V_{T+}$	Positive-Going Threshold Voltage	2.9	3.6	4.3	6.0	6.8	8.6	9	10	12.9	V	ALL	$V_{IN} = V_{SS}$ to $V_{DD}$				
$V_{T-}$	Negative-Going Threshold Voltage	0.7	1.4	1.9	1.4	3.2	4.0	2.1	5	6	V	ALL	$V_{IN} = V_{DD}$ to $V_{SS}$				
$V_{T+toT-}$	Hysteresis	1.0	2.2	3.6	2.0	3.6	7.2	3	5	8	V	ALL	Guaranteed Hysteresis = $V_{T+}$ Minus $V_{T-}$				
$I_{DD}$	Quiescent Power Supply Current	XC	1		2		4	$\mu$ A	MIN, 25 $^{\circ}$ C	All Inputs at OV or $V_{DD}$ .							
			7.5		15		30										
		XM	0.25		0.5		1	$\mu$ A	MAX								
			7.5		15		30										

**NOTES:**

- Additional dc characteristics are listed in this section under Fairchild 4000B series CMOS family characteristics.

GUARANTEED TRIGGER THRESHOLD VOLTAGE



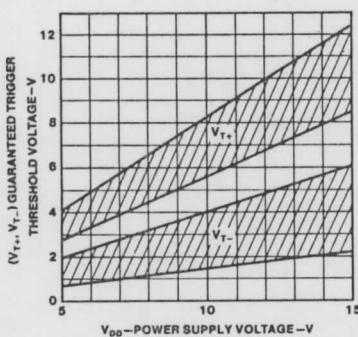
AC CHARACTERISTICS:

SYMBOL	PAR
tPLH	Propagation Delay
tPHL	
tTLH	
tTHL	Output Transit

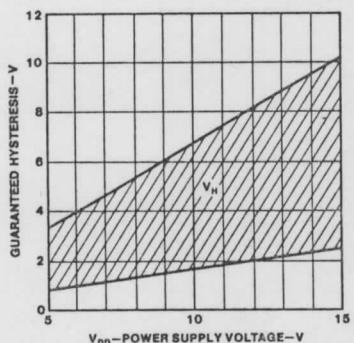
NOTE:  
Propagation Delays and Output

# FAIRCHILD CMOS • 4093B

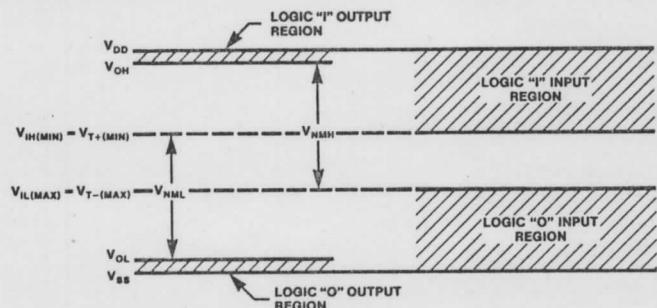
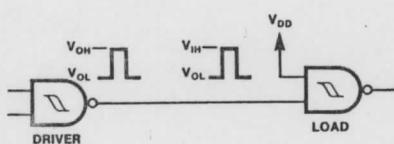
GUARANTEED TRIGGER THRESHOLD VERSUS V<sub>DD</sub>



GUARANTEED HYSTERESIS VERSUS V<sub>DD</sub>



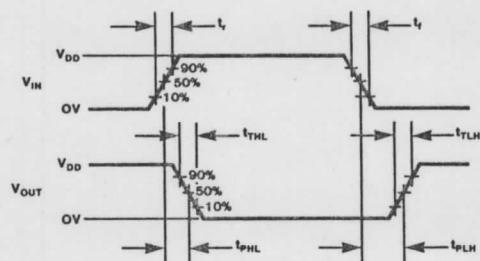
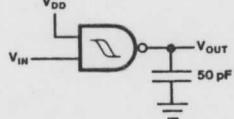
INPUT AND OUTPUT CHARACTERISTICS



$$V_{NML} = V_{IH(MIN)} - V_{OL} \approx V_{IH(MIN)} = V_{T+ (MIN)}$$

$$V_{NMH} = V_{OH} - V_{IL(MAX)} \approx V_{DD} - V_{IL(MAX)} = V_{DD} - V_{T- (MAX)}$$

AC TEST CIRCUITS AND SWITCHING TIME WAVEFORMS



AC CHARACTERISTICS: V<sub>DD</sub> as shown, V<sub>SS</sub> = 0 V, T<sub>A</sub> = 25°C

SYMBOL	PARAMETER	LIMITS									TEST CONDITIONS See Note 2	
		V <sub>DD</sub> = 5 V			V <sub>DD</sub> = 10 V			V <sub>DD</sub> = 15 V				
		MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX		
t <sub>PLH</sub>	Propagation Delay		60	110		25	60		20	48	ns	
t <sub>PHL</sub>			60	110		25	60		20	48	ns	
t <sub>TLH</sub>	Output Transition Time		60	135		30	70		20	45	ns	
t <sub>THL</sub>			60	135		30	70		20	45	ns	

NOTE:  
Propagation Delays and Output Transitions Times are Graphically Described in Section Under Series CMOS Family Characteristics.